particularly useful in certain lines of botanical research, especially in ecology where relative humidity readings must form the basis of a large part of the work. The one advantage of the machine is its compactness, making it easily portable with little danger of accidental breakage. Furthermore, the cost of construction is little more than the cost of a good pair of thermometers which should be 8 or 10 inches in length. If

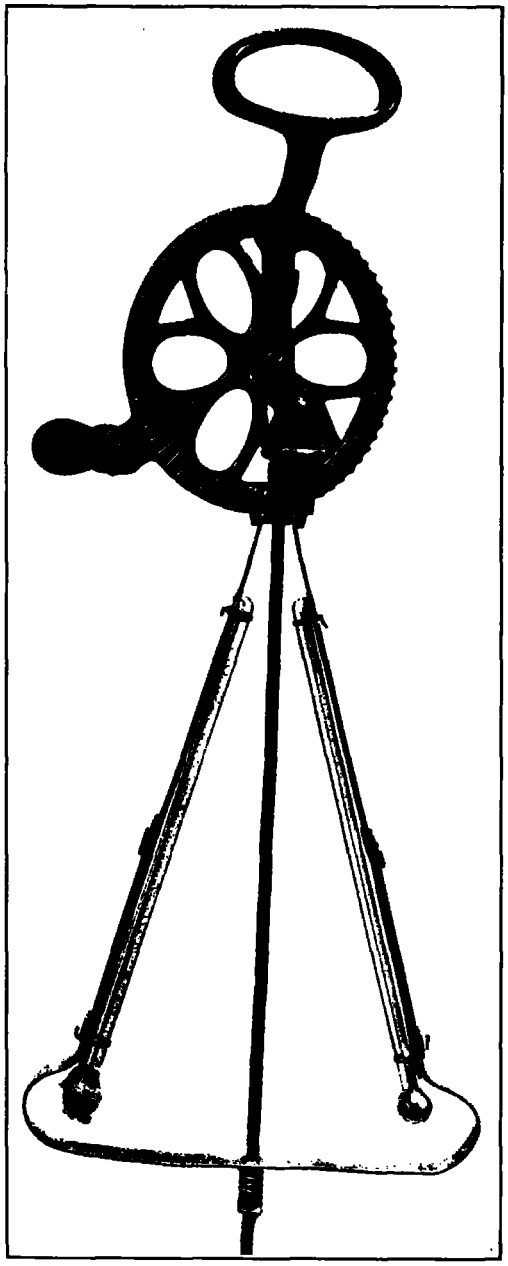

FIG. 1.—O'Gara's portable rotation psychrometer.

desired, the axis, around which the frame and thermometers turn, may be prolonged some distance beyond the end of the frame and rest against a tree or other fixt object while whirling. However, in order to insure accuracy in the results, the instrument should be moved about as much as possible, or as far as the space will allow, while it is being whirled. The writer has constructed several of these instruments and has found no difficulty in getting just as accurate readings as with the standard psychrometer now in use at the different Weather Bureau stations.

THE PSYCHROMETER: ROTATED, WHIRLED, VENTILATED.

The preceding article by P. J. O'Gara is welcome as showing that at least one of the modern improvements in psychrometry has been accepted by biologists, viz, the necessity of ventilation. There are other matters quite well worth considering. The formulas and tables devised by Ferrel and those used in both American and German weather bureaus are constructed for thermometers with cylindrical bulbs; appreciable changes in these tables are required if, as indicated in Mr. O'Gara's drawing (see fig. 1), spherical bulbs are used. This change is not wholly a question of convenience or sensitiveness, but arises from the differences in radiation, absorption, and evaporation between spherical and cylindrical surfaces. Anyone intending to use the published tables should provide himself with thermometers having cylindrical bulbs.

Mr. O'Gara has devised an arrangement that is safer and more convenient than the sling psychrometer for use close to the ground and in other contracted localities where the ordinary sling can not be used. Both this device and the sling are, however, inferior in accuracy to those forms of apparatus in which the thermometers are whirled in shelters or enclosed in separate tubes and the air drawn over them by some convenient method. Assmann uses a centrifugal fan attached to one end of the ventilation tube, and his fan may be driven by clockwork or electric motor. One could easily substitute a fan driven by hand or any other mechanical agency. All these details, however, involve increased cost and complication, and the O'Gara device is very good where results of the highest accuracy are not essential. If it is desired to ascertain the moisture in a very limited portion of air, we accomplish this by simply pointing the ventilation tubes into that air and working the fan. As the ventilation tubes protect the thermometer from radiation, Assmann's apparatus gives more correct temperatures and moistures than unprotected thermometers.

A high grade of thermometer is necessary in psychrometric work, since it is the difference between the dry-bulb and wet-bulb that enters the psychrometric tables, and this difference should be correct to within a tenth of a degree, an accuracy that is not attained by ordinary thermometers. The velocity of ventilation, or rotation of the thermometers, should be between 15 and 25 feet per second in order to harmonize with the velocities used in obtaining the data on which the standard psychrometric tables are based. The Weather Bureau tables are not applicable to the stationary unventilated wet-bulb thermometer with coarse cotton wick extending down to a vessel of water. In fact, that older form of psychrometer is too crude to give results at all comparable in accuracy with modern good methods.

From a meteorological, or a hygienic, or a biological point of view it is often of more importance to ascertain correctly the general condition of a large mass of air than the exact condition of a specific small mass. The former desideratum is best attained by using some form of rotating or whirling psychrometer freely exposed to the wind;[1] the latter is attained by using the form of psychrometer recommended by Belli and perfected by Assmann, which draws the specific mass of air directly past and close to the thermometer bulbs.

Still higher accuracy is of course attained by using some perfected form of dew-point apparatus, but this deals with a still more limited quantity of air that is temporarily in immediate contact with the bedewed surface.—*C. A.*

WEATHER BUREAU MEN AS EDUCATORS.

H. W. Grasse, Assistant Observer, Moorhead, Minn., reports that a class of 42 students from the Moorhead State Normal School visited the local office on January 19 and 20.

[1] Doctor Craig used a sling, but enclosed the thermometer in thin metallic tubes.

Eric R. Miller, Local Forecaster, Madison, Wis., reports that he has been requested to give instruction in meteorology and climatology at the University of Wisconsin. The course will begin in February and continue until June.

H. W. Richardson, Local Forecaster, reports that a class of 20 students from the Superior, Wis., State Normal School visited the Duluth, Minn., office on January 18; and on January 21, 40 students from the Finnish National College, Smithville, Minn., visited the Duluth, Minn., office and had the workings of the Bureau explained them thru an interpreter.

M. R. Sanford, Local Forecaster, Syracuse, N. Y., reports that on December 10, 1908, the class in physical geography of the Fayetteville, N. Y., High School visited the Syracuse office. On December 14, 1908, Mr. Sanford delivered an address at the new High School auditorium; on January 4 and 20 he spoke before local church clubs.

J. Warren Smith, Section Director, Columbus, Ohio, reports that he resumed the regular course in meteorology at the Ohio State University the first week in January. This course of two hours weekly during twelve weeks of the winter term is required of juniors in the College of Agriculture. He also delivered three lectures before 250 students in the Short Course of that college. The class in meteorology at the State University visited the local office on January 14 and 15. A class from the High School for Girls visited the office on the 19th.

C. D. C. Thompson, Observer, gave an informal talk on January 15 before the Mens' Club of Trumbull Avenue Presbyterian Church, Detroit, Mich., about the Weather Bureau and its work.

J. F. Voorhees, Local Forecaster, Knoxville, Tenn., reports that on January 26 and 27 he gave, at the invitation of the Tennessee State Nurserymens' Association, a talk on "The relation of the U. S. Weather Bureau to fruit growing in Tennessee."—*C. A., jr.*

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Librarian.

The following have been selected from among the titles of books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be lent for a limited time to officials and employees who make application for them. Anonymous publications are indicated by a ——.

American climatological association.
Transactions. 1908. v. 24. Philadelphia. xxii, 290 p. 8°.

Austria-Hungary. K. k. Central-Anstalt für Meteorologie und Geodynamik.
Jahrbücher . . . Jahrgang 1906. Neue Folge. 43. Band. Wien. 1908. f°.

Bologna. Università. Osservatorio.
Osservazioni meteorologiche 1907. Bologna. 1908. 31 p. f°.

Bulgaria. Institut météorologique central.
Bulletin sismographique. no. 3. Sofia. 1908. 43 p. 8°.

Calvert, Philip P.
Map showing the distribution of actual mean annual temperatures in Mexico and Central America. (From Biologia Centrali-Americana. London.) 26 x 32 cm.

Chemulpo (Korea). Meteorological observatory.
Results of the meteorological observations made at the Japanese meteorological stations in Korea. 1907. Chemulpo. [1907–8.] f°.

Dechevrens, Marc.
Les phénomènes de température dans les tourbillons et en particulier dans la haute atmosphère. Roma. 1908. 34 p. 4°. [Estratto dalle Memorie della pontificia accademia romana dei nuovi Lincei. v. 26.]

Dutch West Indies. Inspectie van den Landbouw.
. . . Meteorologische waarnemingen gedaan op de meteorologische stations in den colonien Suriname en Curaçao. 1907. [Paramaribo. 1908. 16 p.] 8°.

Eiffel, G
Atlas météorologique pour l'année 1907 d'après vingt-quatre stations françaises. Paris. 1908. 51 p. 24 pl. f°.

Eredia, Filippo.
La siccità del 1908 nelle Puglie. Roma. 1908. 5 p. 4°.
Sulla misura della neve. Roma. 1908. 8 p. 8°.

Flammarion, Camille.
Annuaire astronomique. 1909. 45 année. Paris. [1908.] 315 p. 12°.

Hamburg. Deutsche Seewarte.
Monatskarte für den nordatlantischen Ozean. Hamburg. 1908. 12 charts. 92 x 62 cm.

Hann, Julius.
Handbuch der Klimatologie. 1. Band: Allgemeine Klimalehre. 3. Auflage. Stuttgart. 1908. xiv, 394 p. 8°.

Haynald Observatorium.
. . . Meteorologische Beobachtungen angestellt zu Boroma in Süd-Africa . . . 1891–1892. Kalocsa. 1996. 75 p. f°. (Publicationen des Haynald-Observatoriums. 7 Heft. 1896.)
. . . Meteorologische Beobachtungen . . . zu Boroma und Zumbo in Süd-Africa 1893–1897. Kalocsa. 1905. 94 p. f°.

India. Meteorological department.
Memorandum on the meteorology of India during October and November, 1908 . . . Calcutta. 6 p. f°.

International meteorological committee.
Report of the 8th meeting . . . Paris, September, 1907. London. 1908. 101 p. 8°.

Inwards, Richard.
Weather lore; a collection of proverbs, sayings, and rules concerning the weather. 3d ed. London. 1898. xii, 233 p. 8°.

Latham, Baldwin, *and others.*
Upon the effects of rainfall on the flow of sewage. (Great Britain. Royal commission on sewage disposal. Supplementary volumes presented with the fifth report of the commissioners appointed to inquire and report what methods of treating and disposing of sewage . . . may be properly adopted. London. 1908. 198 p. f°.)

Klossovskii, A.
Page finale des journaux "Revue météorologique" (Travaux du réseau météorologique du sud-ouest de la Russie 1887–1908) et "Annales" de l'Observatoire météorologique et magnétique de l'Université impériale à Odessa. Odessa. 1908. v, 104 p. 8°. (Russian.)

Knott, Cargill Gilston.
The physics of earthquake phenomena. Oxford. 1908. xii, 281 p. 8°.

Kremsmünster. Sternwarte.
Resultate aus den in den Jahren 1905 and 1906 auf der Sternwarte zu Kremsmünster angestellten meteorologischen Beobachtungen. Linz. 1908. 88 p. 8°.

Leipzig. Erdbebenstation des palaeontologisch-geologischen Institutes.
. . . 10ter Bericht der Erdbebenstation Leipzig. (Abdruck aus den Berichten der mathematisch-physischen Klasse der Königliche sächsischen Gesellschaft der Wissenschaften zu Leipzig. 60. Band. Sitzung vom 20. Juli 1908.)

Martin, Edward A.
Some considerations concerning dew-ponds. South Norwood. (Reprinted from the Transactions of the Southeastern union of scientific societies. 1908.) p. 66–85. 8°.

Merveille, E.
. . . La section magnétique. Édition française. Barcelone. 1908. 74 p. f°. (Mémoires de l'Observatoire de l'Ebre sis à Roquetas. Dépendant du College d'études supérieures de la Cie de Jésus de Tortosa . . . no. 3.)

Mill, Hugh Robert.
The rainfall of Kent. [From the "Water supply of Kent," Mem. Geological survey, 1908, pages 20 to 27.] 1908.

Moore, Edward.
A cloudburst in the high Sierra. (Bulletin of the California physical geography club. Berkeley. v. 2. Dec., 1908. p. 24–27.)

Palmer, W. S.
Wyoming's climate, and its effect on crop production. (*In* The third Trans-Missouri dry farming congress at Cheyenne, Wyoming, Feb. 23d, 24th, and 25th, 1909 . . . Cheyenne. 1909. p. 51–54.)

Poincaré, Lucien.
. . . The new physics and its evolution. London. 1907. xv, 344 p. 12°.

Prussia. Königliches preussisches aeronautisches Observatorium bei Lindenberg.
Ergebnisse der Arbeiten . . . 1907. Braunschweig. 1908. xxi, 115 p. f°.

Richter, C. M.
The relation of anticyclonic weather to the prevalence of la grippe and pneumonia on the northern hemisphere with special reference to recent epidemics of pneumonia in Chicago and San Francisco. Chicago. 1908. 11 p. 8°. (Reprinted from the Journal of the American medical association, Aug. 22, 1908, v. 51, p. 660–663.)

[Rykachev, M. A.]
Liste préalable des travaux sur les régions arctiques publiés en Russie de 1883 à 1906. St. Pétersbourg. 1906. 16 p. 8°.

Sinclair, W. J. H.
. . . The weather and climate of Peterhead. Peterhead. 1905. 30 p. 8°. (Reprinted from the Transactions of the Buchan field club.)